Fig-1a

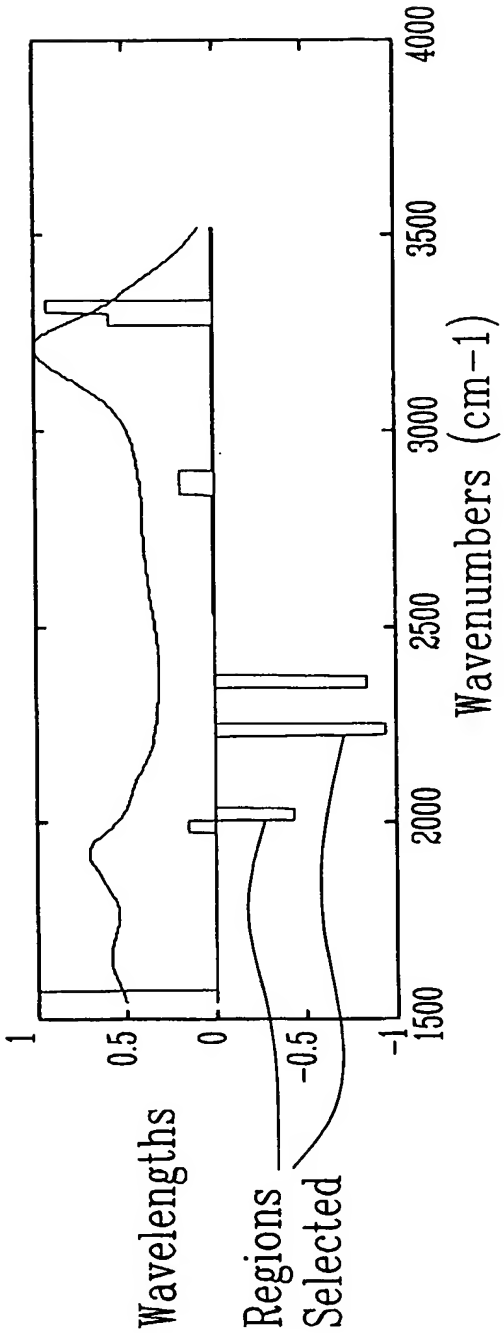

Wavelengths
Regions Selected
1
0.5
0
-0.5
-1
1500
2000
2500
3000
3500
4000
Wavenumbers (cm-1)

Fig-1b

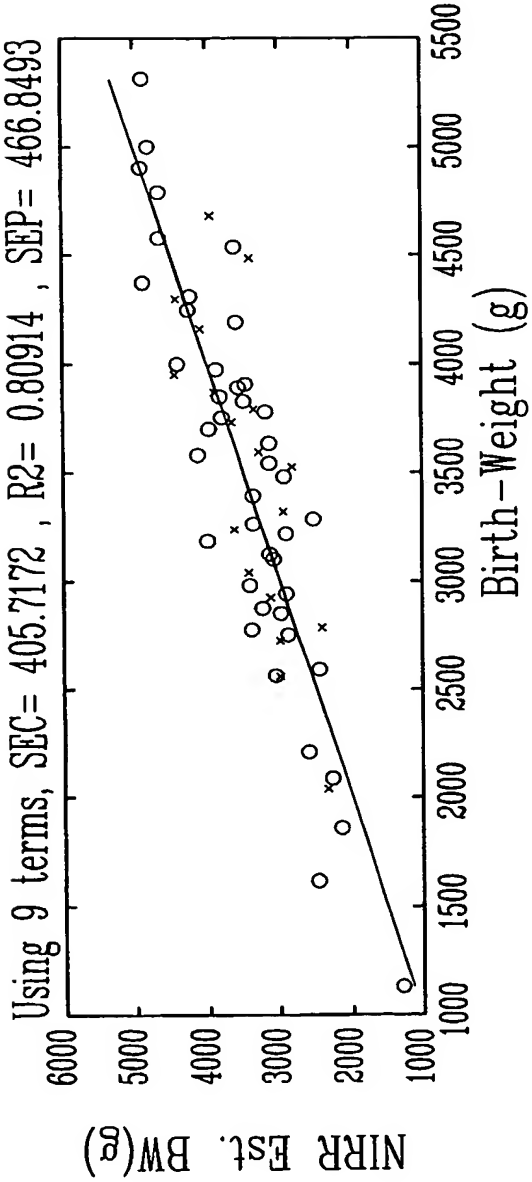

Using 9 terms, SEC= 405.7172 , R2= 0.80914 , SEP= 466.8493
NIRR Est. BW(g)
Birth-Weight (g)
1000
2000
3000
4000
5000
6000
1500
2500
3500
4500
5500

Fig-1c

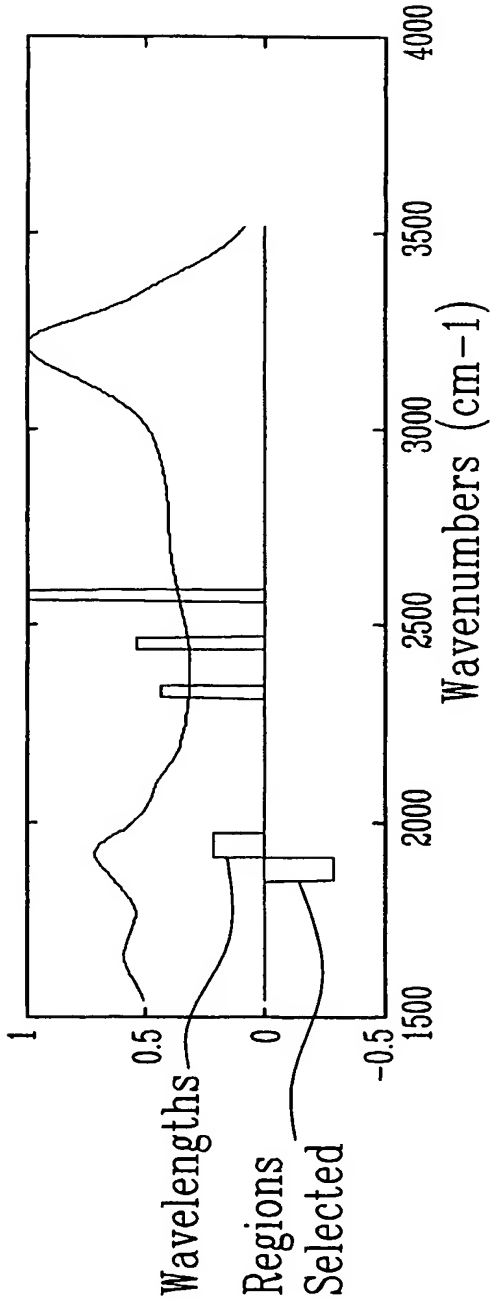

Wavelengths
Regions
Selected
1
0.5
0
-0.5
1500
2000
2500
3000
3500
4000
Wavenumbers (cm-1)

Fig-1d

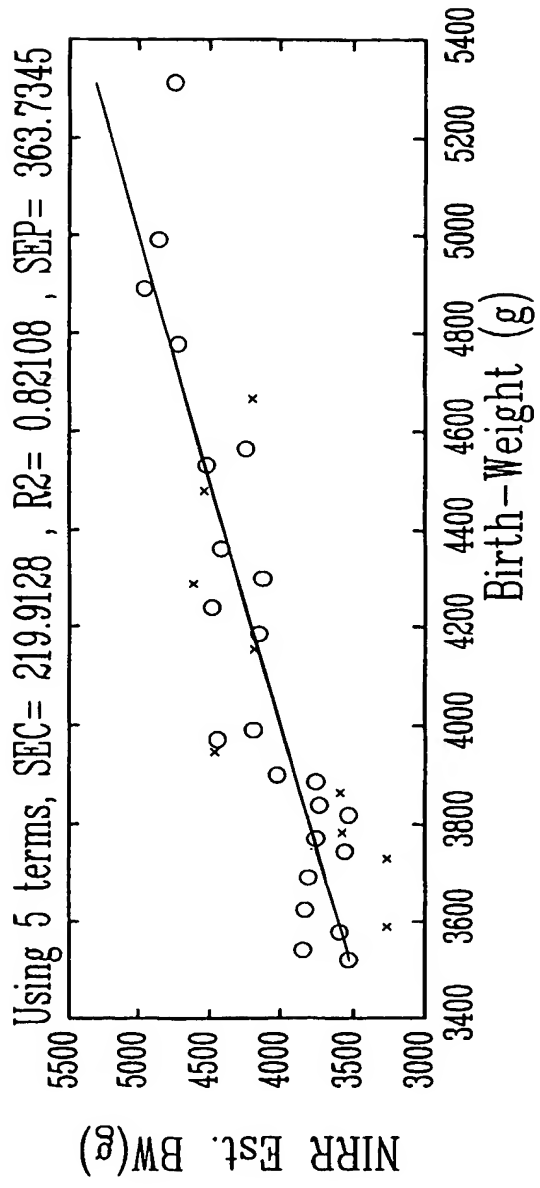

Using 5 terms, SEC= 219.9128 , R2= 0.82108 , SEP= 363.7345
NIRR Est. BW(g)
Birth-Weight (g)
5500
5000
4500
4000
3500
3000
3400
3600
3800
4000
4200
4400
4600
4800
5000
5200
5400

Fig-1E

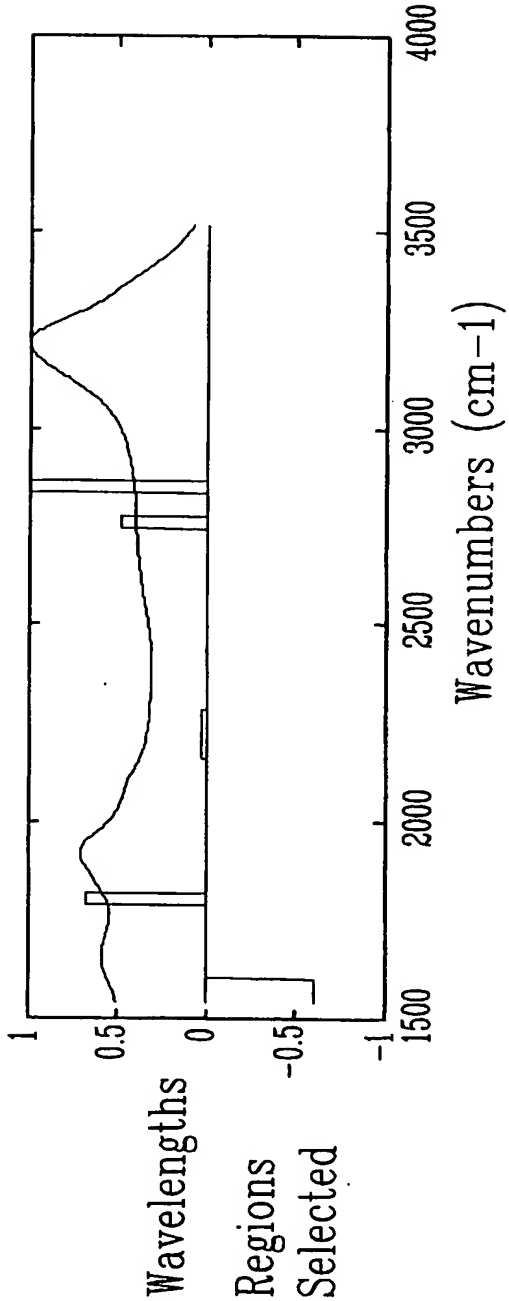
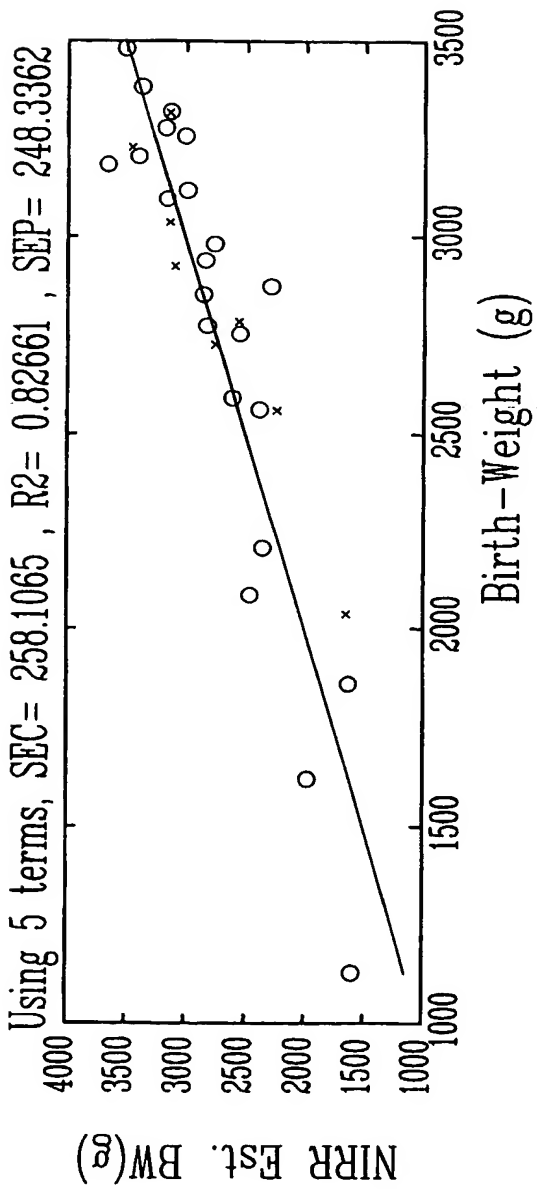

Wavelengths
Regions
Selected
1
0.5
0
-0.5
-1
1500
2000
2500
3000
3500
4000
Wavenumbers (cm-1)

Fig-1F


Using 5 terms, SEC= 258.1065 , R2= 0.82661 , SEP= 248.3362
NIRR Est. BW(g)
Birth-Weight (g)
4000
3500
3000
2500
2000
1500
1000
1000
1500
2000
2500
3000
3500

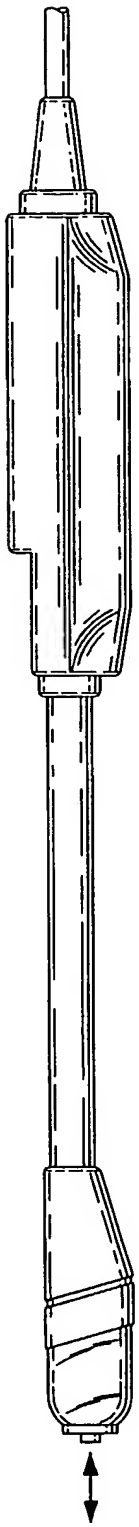


Fig-2

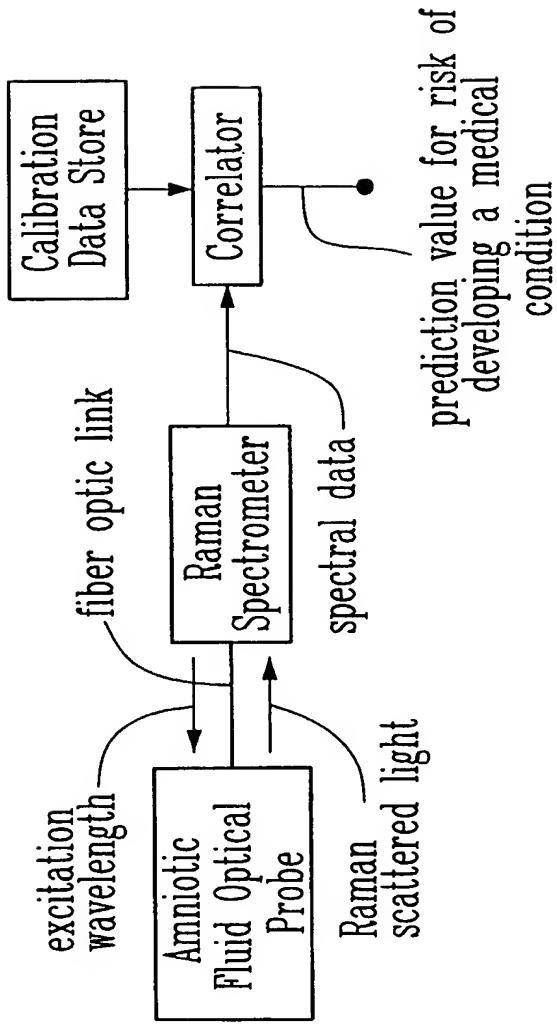

Calibration Data Store
Correlator
prediction value for risk of developing a medical condition
fiber optic link
Raman Spectrometer
spectral data
excitation wavelength
Amniotic Fluid Optical Probe
Raman scattered light

Fig-3

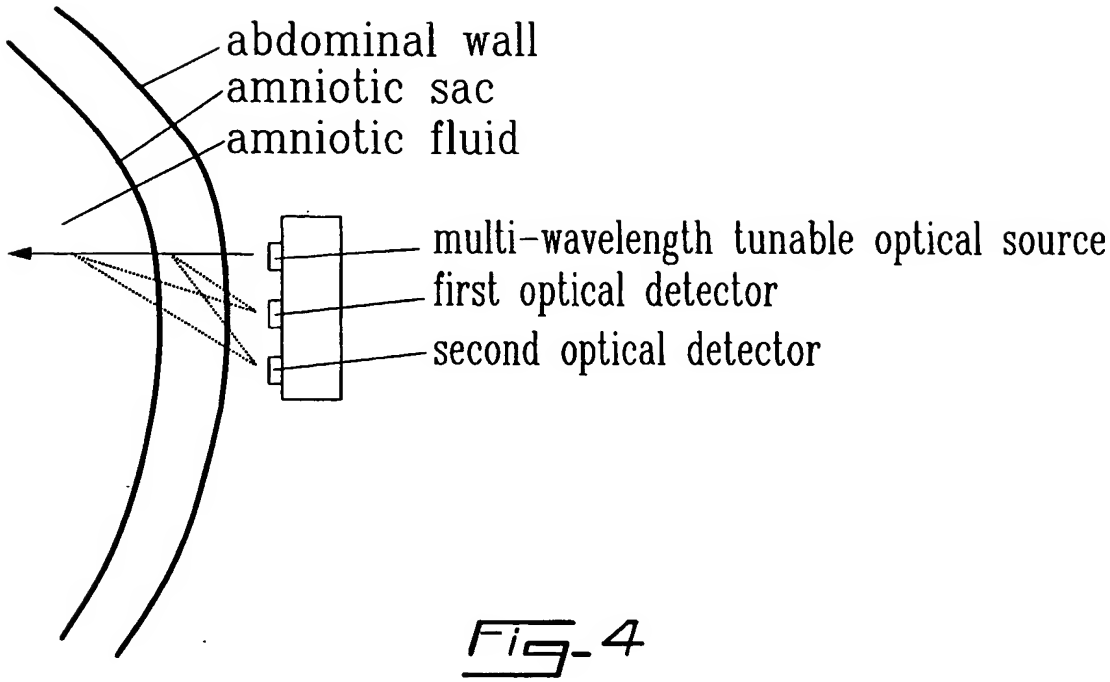

abdominal wall
amniotic sac
amniotic fluid
multi-wavelength tunable optical source
first optical detector
second optical detector

Fig. 4

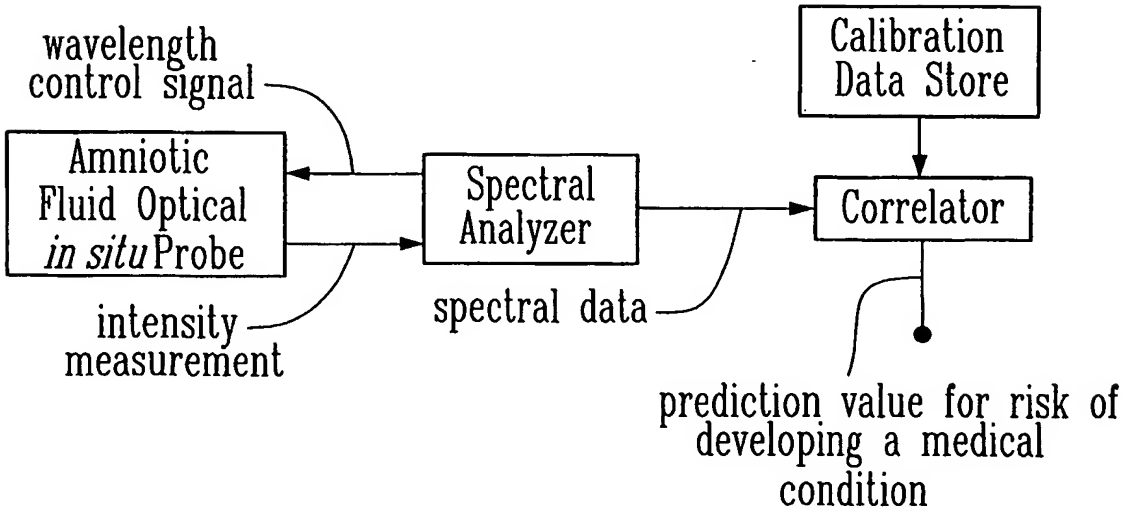

wavelength control signal
Amniotic Fluid Optical in situ Probe
intensity measurement
Spectral Analyzer
spectral data
Calibration Data Store
Correlator
prediction value for risk of developing a medical condition

Fig. 5

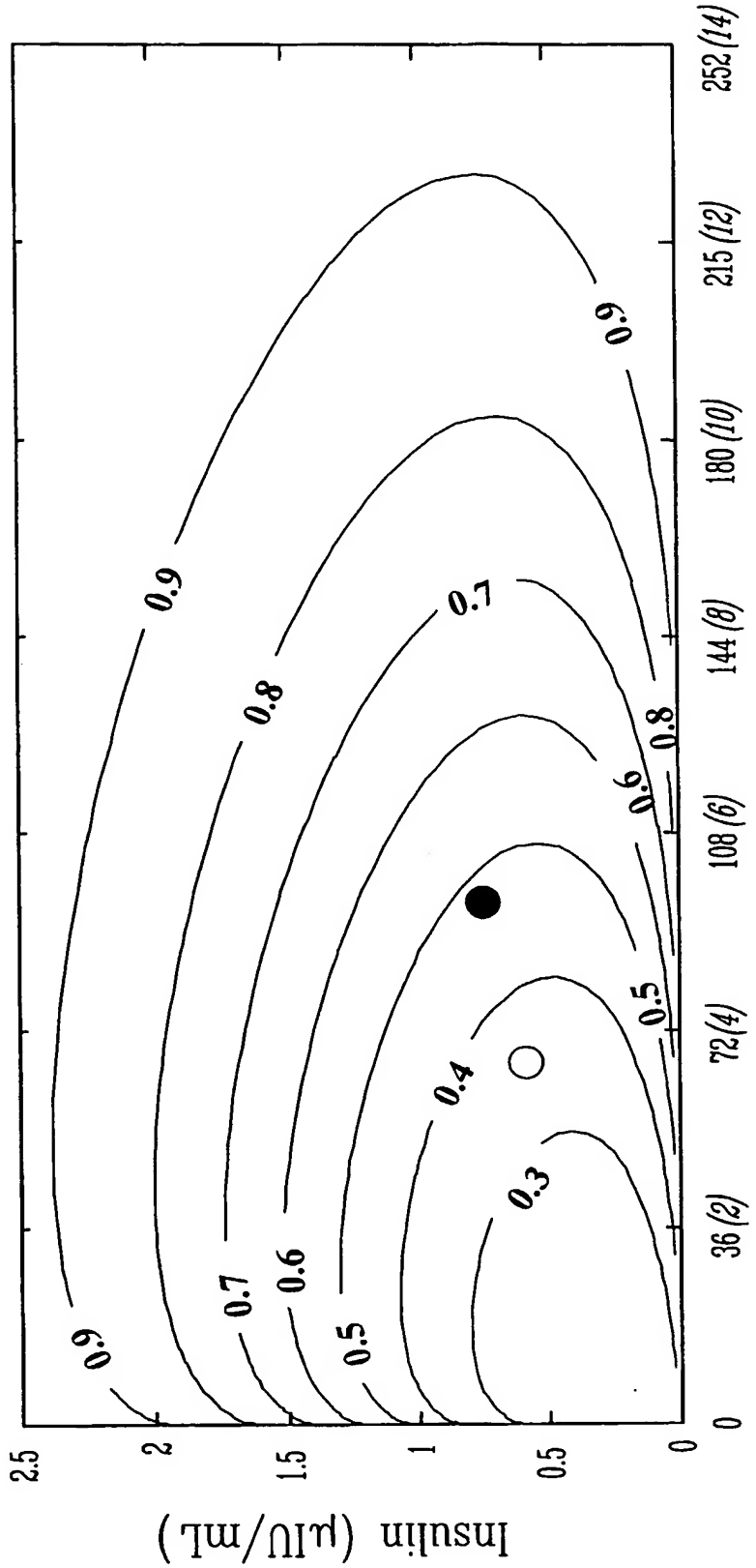

Insulin (μIU/mL)
2.5
2
1.5
1
0.5
0
Glucose mg/dL (mmol/L)
36 (2)
72 (4)
108 (6)
144 (8)
180 (10)
215 (12)
252 (14)
0.9
0.8
0.7
0.6
0.5
0.4
0.3

Fig. 6

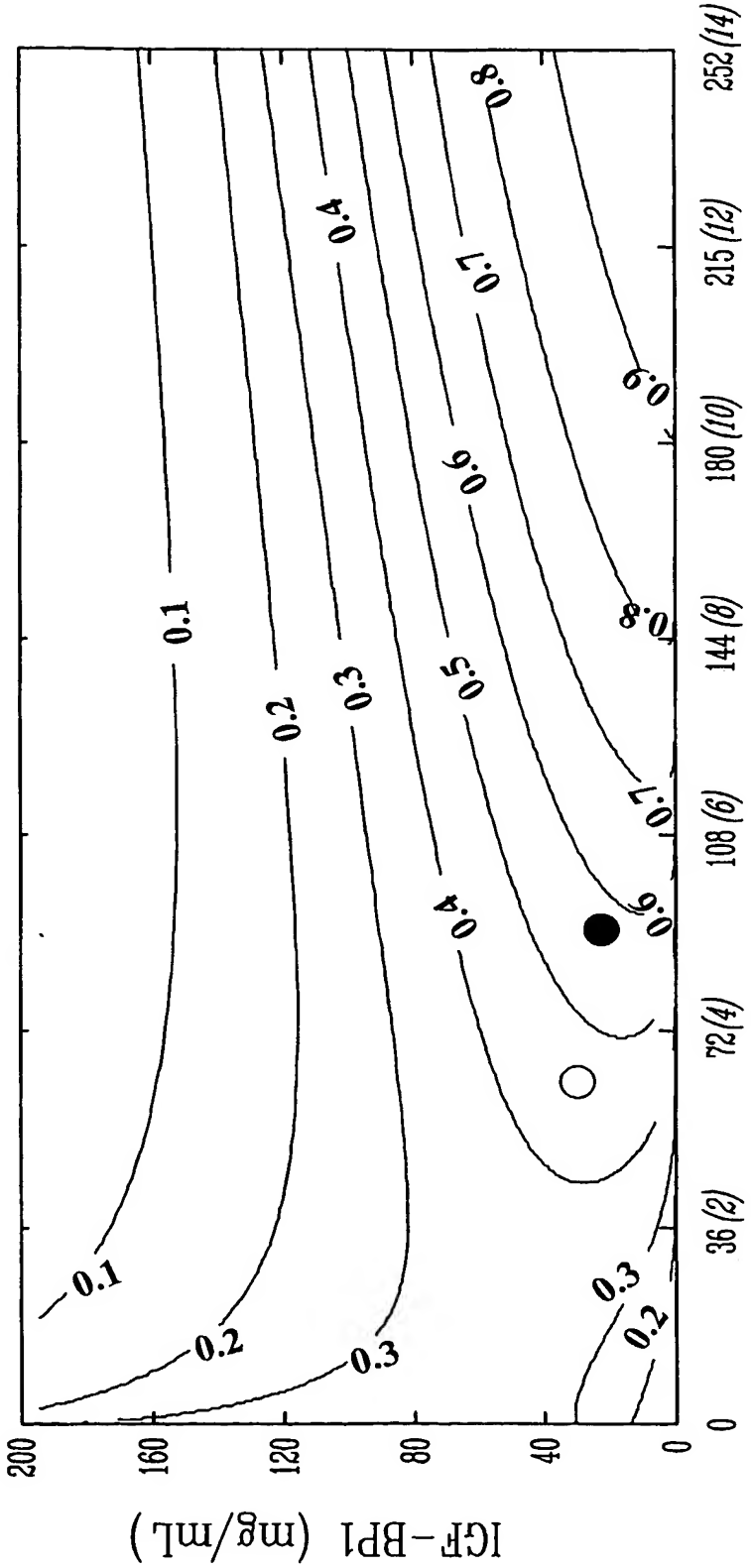

IGF-BP1 (mg/mL)
200
160
120
80
40
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Glucose mg/dL (mmol/L)
36 (2)
72 (4)
108 (6)
144 (8)
180 (10)
215 (12)
252 (14)

Fig-7

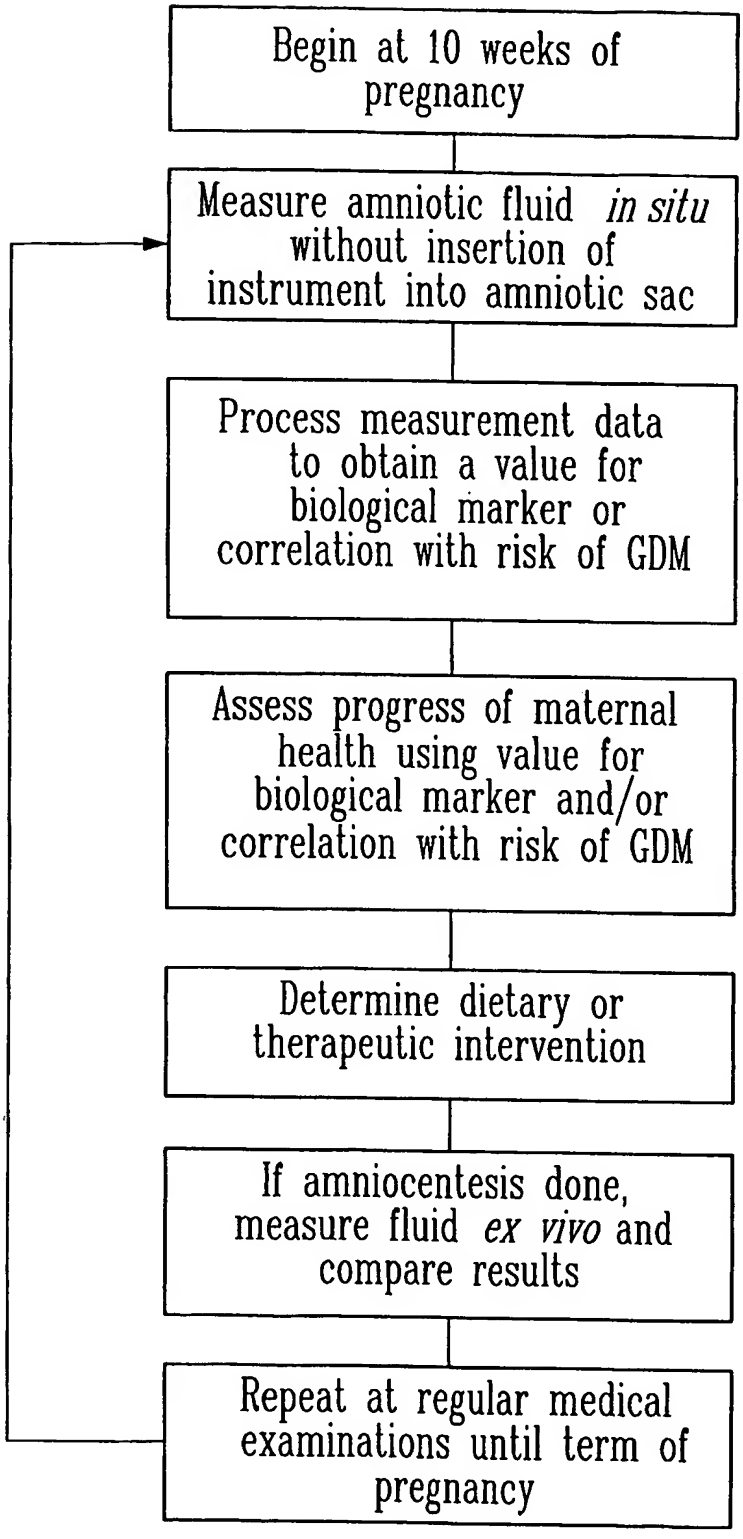

Begin at 10 weeks of pregnancy
Measure amniotic fluid *in situ* without insertion of instrument into amniotic sac
Process measurement data to obtain a value for biological marker or correlation with risk of GDM
Assess progress of maternal health using value for biological marker and/or correlation with risk of GDM
Determine dietary or therapeutic intervention
If amniocentesis done, measure fluid *ex vivo* and compare results
Repeat at regular medical examinations until term of pregnancy

Fig. 8